

WHAT IS CLAIMED IS:

Sub 1
1. An array antenna reception apparatus comprising:
an array antenna having M (M is an integer of not less
than 1) antenna elements linearly laid out on each side
5 (sector) of a polygon having K, (K is an integer of not
less than 3) sides; K adaptive receivers each for
receiving reception signals from the M antenna elements
for a corresponding sector, independently forming a
directional pattern having a gain in a desired signal
10 direction for the sector, receiving a desired signal, and
suppressing an interference signal; and a demodulated
signal synthesizer for receiving K demodulated signals as
outputs from said K adaptive receivers, weighting and
synthesizing the signals, and outputting a demodulated
15 signal for a user.

2. An apparatus according to claim 1, wherein the
directional pattern of each sector of said array antenna
is formed outside each side of the polygon.

3. An apparatus according to claim 1, wherein said
20 demodulated signal synthesizer selects a demodulated
signal having maximum desired signal power in weighting
and synthesizing the K demodulated signals.

4. An apparatus according to claim 1, wherein said
demodulated signal synthesizer selects a demodulated
25 signal having a maximum ratio of desired signal power to

interference power in weighting and synthesizing the K demodulated signals.

Sup. 5 An apparatus according to claim 1, wherein said demodulated signal synthesizer performs weighting synthesis (maximum ratio synthesis) so as to maximize a ratio (SIR) of desired signal power to interference power in weighting and synthesizing the K demodulated signals.

6. An apparatus according to claim 1, wherein each of said K adaptive receivers comprises M despread means
10 for receiving code division multiple access (CDMA) signals received by said M antenna elements and a determination symbol obtained by hard determination for the demodulated signal for a user, and despreading each of the M antenna reception signals using a desired user spread code, a
15 weighting synthesizer for forming a directional pattern, a demodulator for estimating a transmission path, a multiplier for multiplying a user determination symbol by a complex transmission path estimation value as an output from said demodulator to cancel a phase change caused by
20 phase lock of a carrier wave, a subtracter for subtracting an output from said weighting synthesizer from an output from said multiplier to detect an antenna weight control error, delay means for delaying outputs from said M spread means in accordance with a processing time of said
25 demodulator, and antenna weight control means for

controlling and outputting antenna weights on the basis of a least mean square error (MMSE) so as to minimize average power of the antenna weight control error using outputs from said delay means and the antenna weight control error.

5 7. An apparatus according to claim 1, wherein each of said K adaptive receivers comprises M despread means for receiving code division multiple access (CDMA) signals received by said M antenna elements and despread each of the M antenna reception signals using a desired user spread code, arrival direction estimation means for
10 estimating an arrival direction from outputs from said M despread means, antenna weight generation means for generating antenna weights from outputs from said arrival direction estimation means, a weighting synthesizer for
15 forming a directional pattern from the antenna weights, and a demodulator for estimating a transmission path.

8. An apparatus according to claim 6, wherein said weighting synthesizer comprises M complex multipliers for receiving the M antenna reception signals and the antenna
20 weights, and multiplying the received signals by M complex antenna weights, and an adder for adding outputs from said M complex multipliers.

Sub 9.
25 An apparatus according to claim 6, wherein said demodulator comprises transmission path estimation means for receiving an output from said weighting synthesizer

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and estimating an amplitude and phase of the carrier wave,
complex conjugate operation means for obtaining a complex
conjugate of a complex transmission path estimation value
as an output from said transmission path estimation means,
5 and a multiplier for multiplying an output from said
despread means by an output from said complex conjugate
operation means to phase-lock the carrier wave.

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